

## REMARKS

Claims 1, 3-19, 21-24, 26-29 and 31-38 are pending in the present application. Claims 1-19, 21-24, 26-29 and 31-38 have been examined, claims 1, 5-10, 12-19, 21, 23, 24, 26-29, 31 and 33-38 are rejected, and claims 2-4, 11, 22 and 32 are objected to. In the above amendments, claims 1, 3, 7-11, 13-15, 21, 23, 26, 28, 33, 35 and 37 have been amended, and new claims 39-49 have been added. Therefore, after entry of the above amendments, claims 1-19, 21-24, 26-29 and 31-49 will be pending in this application. Applicant believes that the present application is now in condition for allowance, which prompt and favorable action is respectfully requested.

### Objected to Claims 2-4, 11, 22 and 32

Claims 2-4, 11, 22 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Independent claim 1 has been amended to include all of the limitations of objected to claim 2. Claim 2 has been canceled as a result. Applicant submits that claim 1 is now allowable. Claims 3-7 and 9 are dependent on claim 1 and are also allowable.

Independent claims 10 and 13 have each been amended to include all of the limitations of claim 2. Claims 11 and 12 are dependent on claim 10, and claim 14 is dependent on claim 13. Claims 10-14 should also be allowable.

Applicant would like to keep claims 22 and 32 in dependent form in the present amendment.

### Rejection of Claims 1, 10 and 13 Under 35 U.S.C. §112, Second Paragraph

Claims 1, 10 and 13 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite because the phrase "transmit multiple of said data packets in an interlaced manner" is deemed vague and indefinite. Claims 1, 10 and 13 have been amended to delete this phrase.

### Rejection of Claims 1, 5-7, 10, 12 and 13 Under 35 U.S.C. §103(a)

Claims 1, 5-7, 10, 12 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Piiranien (US 7,031,419) in view of Ebert *et al* (US 7,155,171).

Independent claims 1, 10 and 13 have each been amended to include all of the limitations of objected to claim 2. Claims 5-7 are dependent on claim 1, and claim 12 is dependent on claim 10. Claims 1, 5-7, 10, 12 and 13 should be allowable.

Accordingly, the §103(a) rejection of claims 1, 5-7, 10, 12 and 13 should be withdrawn.

**Rejection of Claims 15-19, 21, 23, 24, 26-29 and 31-38 Under 35 U.S.C. §103(a)**

Claims 15-19, 21, 23, 24, 26-29 and 31-38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kim (US 20040114691) in view of Piiranien (US 7,031,419).

Claim 15 of the present application, as amended, recites:

“A method of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

obtaining a block of detected symbols for a data packet, wherein the detected symbol block is an estimate of a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet;

decoding all detected symbol blocks obtained for the data packet to provide a decoded packet;

determining whether the decoded packet is correct or in error; and

repeating the obtaining, decoding, and determining for another one of the plurality of data symbol blocks if the decoded packet is in error.”

Applicant submits that claim 15 is patentable over Kim in view of Piiranien for at least the following reasons.

First, the combination of Kim and Piiranien does not disclose “wherein the detected symbol block is an estimate of a data symbol block ..., and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet,” as recited in claim 15. The rejection indicates that paragraphs 11, 12, 14, 16, 107, 108, 110, 151, 216, 235, 260 and 261 of Kim disclose this feature of claim 15. Paragraphs 11, 12, 14 and 16 describe detecting user symbols for a particular user from a symbol block containing symbols from multiple users. Paragraphs 107 and 108 describe an analog portion of a transmitter. Paragraphs 110,

151, 216 and 235 briefly describe block diagrams of different receivers. Paragraphs 260 and 261 describe an analog portion of a receiver. None of these cited paragraphs describe (i) a plurality of data symbol blocks generated for a data packet and (ii) the detected symbol block being an estimate of one of the plurality of data symbol blocks, as recited in claim 15.

Second, the combination of Kim and Piiranien does not disclose “decoding all detected symbol blocks obtained for the data packet to provide a decoded packet,” as recited in claim 15. The rejection indicates that FIGS. 11, 12, 17 and 31 of Kim disclose this feature of claim 15. FIGS. 11 and 12 show two receivers that detect for symbols from different users. For example, paragraph 119 for FIG. 11 describes “user signals  $\tilde{r}_k^{(1)}$  through  $\tilde{r}_k^{(u)}$ ”, and paragraph 120 describes “u-th user symbol  $r_k^{(u)}$ ”. FIG. 17 shows recovery of symbols for the v-th user (see blocks 254 and 256). FIG. 31 shows recovery of symbols for the u-th user (see block 440 and paragraph 233). None of these cited figures show or describe decoding all detected symbol blocks for the data packet to provide a decoded packet, as recited in claim 15.

Third, the combination of Kim and Piiranien does not disclose “repeating the obtaining, decoding, and determining for another one of the plurality of data symbol blocks if the decoded packet is in error,” as recited in claim 15. The rejection indicates that FIGS. 7 and 10 and paragraph 10 of Kim disclose this feature of claim 15. FIG. 7 shows a flow diagram for a transmitter whereas claim 15 covers a receiver. FIG. 10 shows a process to recover user symbols for the u-th user from a first symbol block. Paragraph 10 describes processing by a transmitter whereas claim 15 covers a receiver. None of these cited figures and paragraph describe repeating (i) obtaining another block of detected symbols for the data packet, (ii) decoding all detected symbol blocks, and (iii) determining whether the decoded packet is correct or in error, if the decoded packet is in error, as recited in claim 15.

In summary, Kim describes recovering symbols for a specific user from among multiple users transmitting simultaneously in the same symbol block. Kim does not describe (i) a plurality of data symbol blocks being generated for a data packet and (ii) decoding all detected symbol blocks whenever a new data symbol block is received.

For at least the above reasons, Applicant submits that claim 15 is patentable over Kim in view of Piiranien. Claims 16-19 are dependent on claim 15 and are patentable for at least

the reasons noted for claim 15. These dependent claims may recite additional features not disclosed nor suggested by Kim and Piiranien.

Independent claims 21, 23 and 26 each recite the features noted above for claim 15. Claim 24 is dependent on claim 23, and claim 27 is dependent on claim 26. Claims 21, 23, 24, 26 and 27 should be patentable for at least the reasons noted above for claim 15.

Claim 28 of the present application, as amended, recites:

“A method of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:  
receiving a block of received symbols for a data packet, wherein the received symbol block is for a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet;  
detecting all received symbol blocks received for the data packet to obtain detected symbol blocks, one detected symbol block for each received symbol block;  
decoding the detected symbol blocks for the data packet to obtain decoder feedback information;  
performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration; and  
generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iterations.”

Applicant submits that claim 28 is patentable over Kim in view of Piiranien for at least the following reasons.

First, the combination of Kim and Piiranien does not disclose “wherein the received symbol block is for a data symbol block ..., and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet,” as recited in claim 28 and discussed above for claim 15.

Second, the combination of Kim and Piiranien does not disclose “detecting all received symbol blocks received for the data packet to obtain detected symbol blocks,” as recited in claim 28 and discussed above claim 15.

Third, the combination of Kim and Piiranien does not disclose “performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration,” as recited in claim 28. The rejection indicates that paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 216, 220, 235 and 239 of Kim disclose this feature of claim 28. Paragraphs 11, 12, 14 and 16 describe detecting user symbols for a particular user from a symbol block containing symbols from multiple users. Paragraphs 110, 151, 216 and 235 of Kim briefly describe block diagrams of different receivers. Paragraphs 114, 155, 220 and 239 describe extracting symbols for a specific user, e.g., only u-th or v-th user symbols. None of these cited paragraphs describe (i) performing the detecting and decoding for a plurality of iterations and (ii) using decoder feedback information from a current iteration for detecting in a subsequent iteration, as recited in claim 28.

In summary, Kim describes recovering symbols for a specific user from among multiple users transmitting simultaneously in the same symbol block. Kim does not describe (i) iteratively performing detecting and decoding for a plurality of iterations and (ii) using feedback information from decoding in the current iteration for detecting in the next iteration.

For at least the above reasons, Applicant submits that claim 28 is patentable over Kim in view of Piiranien. Claims 29, 31 and 32 are dependent on claim 28 and are patentable for at least the reasons noted for claim 28. These dependent claims may recite additional features not disclosed nor suggested by Kim and Piiranien.

Independent claims 33 and 35 each recite the features noted above for claim 28. Claim 34 is dependent on claim 33, and claim 36 is dependent on claim 35. Claims 33-36 should be patentable for at least the reasons noted above for claim 28.

Claim 37 of the present application, as amended, recites:

“A method of receiving a data transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:  
detecting received symbols for a data packet to obtain detected symbols;

decoding the detected symbols to obtain decoder feedback information;  
performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration, wherein the detecting is performed based on a minimum mean square error (MMSE) detector for first N iterations, where N is one or greater, and based on a maximal ratio combining (MRC) detector or a linear zero-forcing (ZF) detector for remaining ones of the plurality of iterations; and  
generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iterations.”

Applicant submits that claim 37 is patentable over Kim in view of Piiranien for at least the following reasons.

First, the combination of Kim and Piiranien does not disclose “performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration,” as recited in claim 37 and discussed above for claim 28.

Second, the combination of Kim and Piiranien does not disclose “wherein the detecting is performed based on a minimum mean square error (MMSE) detector for first N iterations, where N is one or greater, and based on a maximal ratio combining (MRC) detector or a linear zero-forcing (ZF) detector for remaining ones of the plurality of iterations,” as recited in claim 37. The rejection indicates that paragraphs 77, 224, 227, 247 and 251 of Kim disclose this feature of claim 37. Paragraph 77 describes a transmitter whereas claim 37 covers a receiver. Paragraph 224 describes “an embodiment” in which equalizer 406 uses MMSE. Paragraph 227 describes “another embodiment” in which equalizer 406 uses zero forcing. Paragraph 247 briefly describes an equalizer 466. Paragraph 251 describes equalizer 466 using zero forcing. Kim thus describes using either MMSE or zero forcing for an equalizer. None of these cited paragraphs describe repeating (i) using MMSE for the first N iterations and (ii) using MRC or zero forcing for remaining iterations. Using both MMSE and MRC/zero forcing may provide good performance while reducing complexity, as described in paragraph 0095 of the present application.

For at least the above reasons, Applicant submits that claim 37 is patentable over Kim in view of Piiranien. Claim 38 is dependent on claim 37 and is patentable for at least the reasons noted for claim 37.

Accordingly, the §103(a) rejection of claims 15-19, 21, 23, 24, 26-29 and 31-38 should be withdrawn.

**New Claims**

New claims 39-49 recite additional features of the present application. Support for claim 39 is given in paragraph 1041. Support for claim 40 is given in paragraph 1046.

**CONCLUSION**

In light of the amendments contained herein, Applicant submits that the application is in condition for allowance, for which early action is requested.

Applicant hereby requests a two month extension of time to file this Amendment in response to the Final Office Action. Please charge the requisite fee to Deposit Account No. 17-0026. Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

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